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2292	7590	09/22/2004	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			TRAN, MY CHAU T	
			ART UNIT	PAPER NUMBER
			1639	
DATE MAILED: 09/22/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/014,562

Applicant(s)

LARHED ET AL.

Examiner

MY-CHAU T TRAN

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,5-9,11-14,18,20-27 and 31-41 is/are pending in the application.
- 4a) Of the above claim(s) 37-41 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,5-9,11-14,18,21-27 and 31-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12/14/01 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Status of Claims*

1. Applicant's amendment filed 6/21/2004 is acknowledged and entered. Claims 2-4, 10, 15-17, 19, and 28-30 have been canceled. Claims 1, 5, 11, 13, 14, and 18 have been amended. Claims 37-41 have been added.

2. Claim 19 was amended by the amendment filed on 12/24/2003.

3. Claims 2, and 16 were canceled by the amendment filed on 6/6/2003.

4. Claims 1, 3, 5-9, 11-14, 18, 20-27, 31-41 are pending.

### *Election/Restrictions*

5. Claims 3-4, 10, 15, 17, 19, and 28-30 were withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to *nonelected inventions*, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 12/4/03. However, it is noted that applicants has cancelled Claims 3-4, 10, 15, 17, 19, and 28-30 by the amendment filed 6/21/2004.

### *Priority*

6. This application claims priority to a provisional application, 60/255,143, filed 12/14/2000.

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7. Claims 1, 3, 5-9, 11-14, 18, 20-27, 31-41 are treated on the merit in this Office Action.

***Withdrawn Rejections***

8. The rejections of claims 1, 5-9, 11-14, 18, 20-27, and 31-36 under 35 USC 112, second paragraph, as being indefinite have been withdrawn in light of applicant's amendments of claims 1, 5, 11, 13, 14, and 18.

9. The rejection of claim 1 under 35 USC 112, second paragraph, as having insufficient antecedent for the limitation of "non-metal substrate" has been withdrawn in light of applicant's amendment of claim 1.

10. The rejection of claims 1, 5-9, 12-13, 18, 24-27, and 35 under 35 USC 102(b) as being anticipated by Brunet et al. (*J. Org. Chem.*, **1983**, 48(8):1166-1171) has been withdrawn in light of applicant's argument that metal carbonyl of Brunet et al., i.e. cobalt carbonyl, does not acts as CO source in the reference reaction.

11. The rejection of claims 1, 5, 7-9, 12-13, 18, 24-27, and 35-36 under 35 USC 103(a) as being obvious over Brunet et al. (*J. Org. Chem.*, **1983**, 48(8):1166-1171) and Lidström et al. (*Tetrahedron*, **11/5/01**, 57(45):9225-9283) has been withdrawn in view of applicant's arguments, that metal carbonyl of Brunet et al., i.e. cobalt carbonyl, does not acts as CO source in the reference reaction.

***Maintained Rejections***

***Claim Rejections - 35 USC § 102***

12. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. Claims 1, 5, 9, 12-13, 18, 24-27, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Corey et al. (*JACS*, **1969**, 91(5):1233-1234).

Corey et al. disclose a carboxylation of organic halides via nickel carbonyl in protic acid (pg. 1233, left col., line 38 to right col., line 56). The method comprises the reagents of *trans*-1-bromo-2-phenylethylene (non-metal substrate/ non-metal substrate compound), Ni(CO)<sub>4</sub> (metal carbonyl and catalyst), C<sub>4</sub>H<sub>8</sub>NH (organic reactant), and the mixture is heated to 60° C (thermal energy source) (pg. 1233, right col., lines 35-54). The nickel carbonyl acts both as a catalyst and a source of carbonyl. The molar ratio of halide and nickel carbonyl is 1:6. Therefore, the method of Corey et al. anticipates the presently claimed method.

14. Claims 1, 5-9, 11, 13-14, 18, 20-27, and 31-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Zoeller et al. (*Catalysis Today*, **1997**, 36(3):227-241).

Zoeller et al. disclose the method of molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride (Abstract; pg. 228, left col., lines 15-48). The method comprises the reagents of ethyl iodide (non-metal substrate/ non-metal substrate compound), Mo(CO)<sub>6</sub> (metal carbonyl and catalyst), and propionic acid (organic reactant) (pg. 228, right col., line 1 to pg. 230, left col., line 10), and the mixture is heated to a temperature of 150-200° C (thermal

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energy source) (pg. 228, left col., lines 15-21). The molybdenum carbonyl acts both as a catalyst and a source of carbonyl (Abstract; pg. 239, scheme 1; pg. 240, right col., lines 22-48).

Therefore, the method of Zoeller et al. anticipates the presently claimed method.

***Claim Rejections - 35 USC § 103***

15. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

16. Claims 1, 5-9, 11-14, 18, 20-27, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoeller et al. (*Catalysis Today*, **1997**, 36(3):227-241) and Lidström et al. (*Tetrahedron*, **11/5/01**, 57(45):9225-9283).

Zoeller et al. disclose the method of molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride (Abstract; pg. 228, left col., lines 15-48). The method comprises the reagents of ethyl iodide (non-metal substrate/ non-metal substrate compound),  $\text{Mo}(\text{CO})_6$  (metal carbonyl and catalyst), and propionic acid (organic reactant) (pg. 228, right col., line 1 to pg. 230, left col., line 10), and the mixture is heated to a temperature of 150-200° C (thermal energy source) (pg. 228, left col., lines 15-21). The molybdenum carbonyl acts both as a catalyst and a source of carbonyl (Abstract; pg. 239, scheme 1; pg. 240, right col., lines 22-48).

The method of Zoeller et al. does not expressly disclose using microwave as an energy source.

Lidström et al. disclose the use of microwave-assisted organic synthesis (pg. 9231, left col., line 56 to pg. 9232, right col., line 14). The microwave-assisted synthesis would provide an

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advantage of a heating source that is convenient, instantaneous, and very specific (pg. 9232, left col., lines 46-47). Lidström et al. discloses several different organic syntheses that would be benefited by the use of microwave (pg. 9232, right col. Line 20 to pg. 9272).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method by using microwave as an energy source as taught by Lidström et al. in the method of Zoeller et al. One of ordinary skill in the art would have been motivated to modify the method by using microwave as an energy source in the method of Zoeller et al. for the advantage of providing a heating source that is convenient, instantaneous, and very specific (Lidström: pg. 9232, left col., lines 46-47). Furthermore, one of ordinary skill in the art would have reasonably expectation of success in the method combination of Zoeller et al. and Lidström et al. because one critical parameter of catalysis is temperature and having a heat source that produces a uniform and consistent heating of the reaction mixture would provide a control of this critical parameter.

***New Rejections – Necessitated by Amendment***

***Claim Rejections - 35 USC § 112***

17. Claims 37-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 37 recites a method for preparing chemical libraries wherein the step comprises performing the one-pot organic reaction of claim 1. However, the method of claim 1, i.e. a one-pot organic reaction, would produce one compound, i.e. the carbon atoms of the released carbon

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monoxides form a bond with the non-metal substrate compound. It is unclear how chemical libraries, i.e. a collection of individual chemical compounds, are produced from the method of claim 1. Thus claim 37 is vague and indefinite.

### ***Claim Rejections - 35 USC § 102***

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. Claims 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Corey et al. (*JACS*, 1969, 91(5):1233-1234).

*The instant Claim 37 recites a method for preparing chemical libraries. The method comprises the step of performing the one-pot organic reaction of claim 1. The method of claim 1 comprises the steps of preparing a reaction mixture, and exposing the reaction mixture to an energy source to release carbon monoxide from the CO releasing compound. The reaction includes 1) carbon monoxide as a reactant without the use of an external CO gas source; 2) the metal carbonyl is not complexed with or bonded to the non-metal substrate compound prior to preparing the reaction mixture; and 3) the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound. The reaction mixture comprises a carbonyl of the general formula I,  $M_x(CO)_y$  wherein M is a metal, x is an integer, and y is an integer; a non-metal substrate compound; and a metal catalyst. Additionally, the specification define formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); the metal catalyst comprises a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12). It is interpreted that the metal of the carbonyl of the general formula I,  $M_x(CO)_y$  is also the metal catalyst.*



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Corey et al. disclose a carboxylation of organic halides via nickel carbonyl in protic acid (pg. 1233, left col., line 38 to right col., line 56). The method comprises the steps of preparing a reaction mixture, and the mixture is heated to 60<sup>0</sup> C (refers to the claimed method step of exposing the mixture to an energy source, and refers to the claimed thermal energy source of claims 38-39) (see e.g. pg. 1233, left col., lines 42-48; pg. 1233, right col., lines 35-54; pg. 1234, left col. lines 1-12; Table I). The carbonyl is release from the metal carbonyl in order to replace the halogen with carbon functional groups (refers to the claimed limitation that carbon monoxide as a reactant without the use of an external CO gas source and the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound) (see e.g. pg. 1233, left col., lines 32-35; pg. 1233, right col., lines 32-54). The reference reaction schemes show that the nickel carbonyl is not complexed with or bonded to the non-metal substrate compound (refers to the claimed limitation that the metal carbonyl is not complexed with or bonded to the non-metal substrate compound) (see e.g. pg. 1233, left col., lines 32-35; pg. 1233, right col., lines 32-54). The reaction mixture comprises the reagents of organic halides (refers to the claimed non-metal substrate compound), and Ni(CO)<sub>4</sub> (refers to metal carbonyl and catalyst) (see e.g. pg. 1233, left col., lines 42-48; pg. 1233, right col., lines 35-54; Table I). The reference nickel carbonyl is interpreted as both the claimed carbonyl of the general formula I, M<sub>x</sub>(CO)<sub>y</sub>, wherein M is nickel, i.e. Group VIII metal, x is 1, and y is 4, and claimed metal catalyst since the nickel metal of the reference would encompass the specification definition of the claimed metal carbonyl of the general formula I, M<sub>x</sub>(CO)<sub>y</sub>, and the claimed metal catalyst. The reference Table I discloses the methoxycarbonylation of different organic halides (refers to the claimed chemical libraries). Thus, the method of Corey et al. anticipates the presently claimed method.

20. Claims 37-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Zoeller et al. (*Catalysis Today*, **1997**, 36(3):227-241).

*The instant Claim 37 recites a method for preparing chemical libraries. The method comprises the step of performing the one-pot organic reaction of claim 1. The method of claim 1 comprises the steps of preparing a reaction mixture, and exposing the reaction mixture to an energy source to release carbon monoxide from the CO releasing compound. The reaction includes 1) carbon monoxide as a reactant without the use of an external CO gas source; 2) the metal carbonyl is not complexed with or bonded to the non-metal substrate compound prior to preparing the reaction mixture; and 3) the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound. The reaction mixture comprises a carbonyl of the general formula I,  $M_x(CO)_y$  wherein M is a metal, x is an integer, and y is an integer; a non-metal substrate compound; and a metal catalyst. Additionally, the specification define formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); the metal catalyst comprises a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12). It is interpreted that the metal of the carbonyl of the general formula I,  $M_x(CO)_y$  is also the metal catalyst.*

Zoeller et al. disclose the method of molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride (see e.g. Abstract; pg. 228, left col., lines 15-48). The method comprises the steps of preparing a reaction mixture, and the mixture is heated to a temperature of 150-200° C (refers to the claimed method step of exposing the mixture to an energy source, and refers to the claimed thermal energy source of claims 38-39) (see e.g. pg. 228, right col., line 1 to pg. 230, left col., line 10; pg. 228, left col., lines 15-21). The carbonyl is release from the metal carbonyl in order to replace the halogen with carbon functional groups (refers to the claimed limitation that carbon monoxide as a reactant without the use of an external CO gas source and

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the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound) (see e.g. Abstract; pg. 236, right col., lines 12-23). The reference reaction schemes show that the nickel carbonyl is not complexed with or bonded to the non-metal substrate compound (refers to the claimed limitation that the metal carbonyl is not complexed with or bonded to the non-metal substrate compound) (see e.g. pg. 228, right col., line 1 to pg. 230, left col., line 10; pg. 228, left col., lines 15-21). The reaction mixture comprises the reagents of ethyl iodide (refers to the claimed non-metal substrate compound), and  $\text{Mo}(\text{CO})_6$  (refers to metal carbonyl and catalyst) (pg. 228, right col., line 1 to pg. 230, left col., line 10). The reference molybdenum carbonyl is interpreted as both the claimed carbonyl of the general formula I,  $\text{M}_x(\text{CO})_y$ , wherein M is molybdenum, i.e. Group VI metal, x is 1, and y is 6, and claimed metal catalyst since the nickel metal of the reference would encompass the specification definition of the claimed metal carbonyl of the general formula I,  $\text{M}_x(\text{CO})_y$ , and the claimed metal catalyst. (Abstract; pg. 239, scheme 1; pg. 240, right col., lines 22-48). Thus, the method of Zoeller et al. anticipates the presently claimed method.

21. Claim 41 is rejected under 35 U.S.C. 102(b) as being anticipated by Corey et al. (*JACS*, 1969, 91(5):1233-1234).

*The instant Claim 41 recites a kit. The kit comprises a non-catalyzing solid CO releasing compound which is a carbonyl of the general formula I,  $\text{M}_x(\text{CO})_y$  wherein M is a metal, x is an integer, and y is an integer. The kit is interpreted as a "reagent", i.e. a composition. Additionally, the specification define formula I,  $\text{M}_x(\text{CO})_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31).*

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Corey et al. disclose a carboxylation of organic halides via nickel carbonyl in protic acid (see e.g. pg. 1233, left col., line 38 to right col., line 56). The method comprises the reagents of *trans*-1-bromo-2-phenylethylene,  $\text{Ni}(\text{CO})_4$ ,  $\text{C}_4\text{H}_8\text{NH}$ , and the mixture is heated to  $60^\circ\text{C}$  (see e.g. pg. 1233, right col., lines 35-54). The reference teaches the presently claimed carbonyl reagent of the general formula I,  $\text{M}_x(\text{CO})_y$ , wherein M is nickel, i.e. Group VIII metal, x is 1, and y is 4. The carbonyl is release from the metal carbonyl in order to replace the halogen with carbon functional groups (see e.g. pg. 1233, left col., lines 32-35; pg. 1233, right col., lines 32-54). Thus the reagent of Corey et al. anticipates the presently claimed reagent, i.e. kit.

22. Claim 41 is rejected under 35 U.S.C. 102(b) as being anticipated by Brunet et al. (*J. Org. Chem.*, 1983, 48(8):1166-1171).

*The instant Claim 41 recites a kit. The kit comprises a non-catalyzing solid CO releasing compound which is a carbonyl of the general formula I,  $\text{M}_x(\text{CO})_y$  wherein M is a metal, x is an integer, and y is an integer. The kit is interpreted as a "reagent", i.e. a composition. Additionally, the specification define formula I,  $\text{M}_x(\text{CO})_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31).*

Zoeller et al. disclose the method of molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride (Abstract; pg. 228, left col., lines 15-48). The method comprises the reagents of ethyl iodide,  $\text{Mo}(\text{CO})_6$ , and propionic acid (pg. 228, right col., line 1 to pg. 230, left col., line 10), and the mixture is heated to a temperature of  $150\text{-}200^\circ\text{C}$  (thermal energy source) (pg. 228, left col., lines 15-21). The reference teaches the presently claimed reagent of the general formula I,  $\text{M}_x(\text{CO})_y$ , wherein M is molybdenum, i.e. Group VI metal, x is 1, and y is 6. Thus the reagent of Zoeller et al. anticipates the presently claimed reagent, i.e. kit.

***Claim Rejections - 35 USC § 103***

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

25. Claims 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zoeller et al. (*Catalysis Today*, **1997**, 36(3):227-241) and Lidström et al. (*Tetrahedron*, **11/5/01**, 57(45):9225-9283).

*The instant Claim 37 recites a method for preparing chemical libraries. The method comprises the step of performing the one-pot organic reaction of claim 1. The method of claim 1 comprises the steps of preparing a reaction mixture, and exposing the reaction mixture to an energy source to release carbon monoxide from the CO releasing compound. The reaction includes 1) carbon monoxide as a reactant without the use of an external CO gas source; 2) the metal carbonyl is not complexed with or bonded to the non-metal substrate compound prior to*

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*preparing the reaction mixture; and 3) the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound. The reaction mixture comprises a carbonyl of the general formula I,  $M_x(CO)_y$  wherein M is a metal, x is an integer, and y is an integer; a non-metal substrate compound; and a metal catalyst. Additionally, the specification define formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); the metal catalyst comprises a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12). It is interpreted that the metal of the carbonyl of the general formula I,  $M_x(CO)_y$  is also the metal catalyst.*

Zoeller et al. disclose the method of molybdenum-catalyzed carbonylation of ethylene to propionic acid and anhydride (see e.g. Abstract; pg. 228, left col., lines 15-48). The method comprises the steps of preparing a reaction mixture, and the mixture is heated to a temperature of 150-200<sup>o</sup> C (refers to the claimed method step of exposing the mixture to an energy source, and refers to the claimed thermal energy source of claims 38-39) (see e.g. pg. 228, right col., line 1 to pg. 230, left col., line 10; pg. 228, left col., lines 15-21). The carbonyl is release from the metal carbonyl in order to replace the halogen with carbon functional groups (refers to the claimed limitation that carbon monoxide as a reactant without the use of an external CO gas source and the carbon atoms of the released carbon monoxide form a bond with the non-metal substrate compound) (see e.g. Abstract; pg. 236, right col., lines 12-23). The reference reaction schemes show that the nickel carbonyl is not complexed with or bonded to the non-metal substrate compound (refers to the claimed limitation that the metal carbonyl is not complexed with or bonded to the non-metal substrate compound) (see e.g. pg. 228, right col., line 1 to pg. 230, left col., line 10; pg. 228, left col., lines 15-21). The reaction mixture comprises the reagents of ethyl iodide (refers to the claimed non-metal substrate compound), and  $Mo(CO)_6$  (refers to metal carbonyl and catalyst) (pg. 228, right col., line 1 to pg. 230, left col., line 10). The reference

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molybdenum carbonyl is interpreted as both the claimed carbonyl of the general formula I,  $M_x(CO)_y$ , wherein M is molybdenum, i.e. Group VI metal, x is 1, and y is 6, and claimed metal catalyst since the nickel metal of the reference would encompass the specification definition of the claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , and the claimed metal catalyst. (Abstract; pg. 239, scheme 1; pg. 240, right col., lines 22-48).

The method of Zoeller et al. does not expressly disclose using microwave as an energy source.

Lidström et al. disclose the use of microwave-assisted organic synthesis (pg. 9231, left col., line 56 to pg. 9232, right col., line 14). The microwave-assisted synthesis would provide an advantage of a heating source that is convenient, instantaneous, and very specific (pg. 9232, left col., lines 46-47). Lidström et al. discloses several different organic syntheses that would be benefited by the use of microwave (pg. 9232, right col. Line 20 to pg. 9272).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method by using microwave as an energy source as taught by Lidström et al. in the method of Zoeller et al. One of ordinary skill in the art would have been motivated to modify the method by using microwave as an energy source in the method of Zoeller et al. for the advantage of providing a heating source that is convenient, instantaneous, and very specific (Lidström: pg. 9232, left col., lines 46-47). Furthermore, one of ordinary skill in the art would have reasonably expectation of success in the method combination of Zoeller et al. and Lidström et al. because one critical parameter of catalysis is temperature and having a heat source that produces a uniform and consistent heating of the reaction mixture would provide a control of this critical parameter.

***Response to Arguments***

26. Applicant's arguments directed to the rejection under 35 USC 102(b) as being anticipated by Corey et al. (*JACS*, 1969, 91(5):1233-1234) for claims 1, 5, 9, 12-13, 18, 24-27, and 35 were considered but they are not persuasive for the following reasons.

Applicant contends that the claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , is not also a catalyst and the nickel carbonyl of Corey et al. is both a CO source and a catalyst. Thus the method of Corey does not anticipate the presently claimed method.

Applicant's arguments are not convincing since the method of Corey et al. does anticipate the presently claimed method. Based on the specification disclosure define that formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); and the metal catalyst as a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12), the presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$  could act as both a CO source and a catalyst. Additionally, claim 12 recites that the metal catalyst includes nickel. The presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , would not exclude the nickel carbonyl of Corey et al. that acts as both a CO source and a catalyst. Thus the method of Corey et al. does anticipate the presently claimed method and the rejection is maintained.

27. Applicant's arguments directed to the rejection under 35 USC 102(b) as being anticipated by Zoeller et al. (*Catalysis Today*, 1997, 36(3):227-241) for claims 1, 5-9, 11, 13-14, 18, 20-27, and 31-35 were considered but they are not persuasive for the following reasons.



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Applicant alleges that the molybdenum carbonyl of Zoeller et al. is not a CO source and the molybdenum carbonyl is also a catalyst whereas the claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , is a CO source and not also a catalyst. Thus the method of Zoeller et al. does not anticipate the presently claimed method.

Applicant's arguments are not convincing since the method of Zoeller et al. does anticipate the presently claimed method. First, the molybdenum carbonyl of Zoeller et al. is CO source since the rate-limiting step of the reference method is the dissociation of the CO (see e.g. Abstract; pg. 236, right col., lines 12-23). Thus the molybdenum carbonyl of Zoeller et al. is CO source. Second, based on the specification disclosure define that formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); and the metal catalyst as a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12), the presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$  could act as both a CO source and a catalyst. The presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , would not exclude the molybdenum carbonyl of Zoeller et al. that acts as both a CO source and a catalyst. Thus the method of Zoeller et al. does anticipate the presently claimed method and the rejection is maintained.

28. Applicant's arguments directed to the rejection under 35 USC 103(a) as being unpatentable over Zoeller et al. (*Catalysis Today*, 1997, 36(3):227-241) and Lidström et al. (*Tetrahedron*, 11/5/01, 57(45):9225-9283) for claims 1, 5-9, 11-14, 18, 20-27, and 31-36 were considered but they are not persuasive for the following reasons.

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Applicant contends that the method combination of Zoeller et al. and Lidström et al. is not obvious over the presently claimed method because the molybdenum carbonyl of Zoeller et al. is not a CO source and the molybdenum carbonyl is also a catalyst whereas the claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , is a CO source and not also a catalyst. Thus the method combination of Zoeller et al. and Lidström et al. is not obvious over the presently claimed method.

Applicant's arguments are not convincing since the method combination of Zoeller et al. and Lidström et al. is obvious over the presently claimed method. First, the molybdenum carbonyl of Zoeller et al. is CO source since the rate-limiting step of the reference method is the dissociation of the CO (see e.g. Abstract; pg. 236, right col., lines 12-23). Thus the molybdenum carbonyl of Zoeller et al. is CO source. Second, based on the specification disclosure define that formula I,  $M_x(CO)_y$  wherein M comprises metal of transitions elements, or metal from Group I, II, III, IV, V, VI, VII or VIII (see specification pg. 18, lines 27-31); and the metal catalyst as a metal with a ligand and the metal includes Pd, Pt, Rh, Ni, Cu, Cd, Zn, Ti, Sr, Co, Ir, Ru, Ta, W, Fe, Re, or Os (see specification pg. 24, lines 7-12), the presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$  could act as both a CO source and a catalyst. The presently claimed metal carbonyl of the general formula I,  $M_x(CO)_y$ , would not exclude the molybdenum carbonyl of Zoeller et al. that acts as both a CO source and a catalyst. Thus the method combination of Zoeller et al. and Lidström et al. is obvious over the presently claimed method.

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***Conclusion***

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MY-CHAU T TRAN whose telephone number is 571-272-0810. The examiner can normally be reached on Mon.: 8:00-2:30; Tues.-Thurs.: 7:30-5:00; Fri.: 8:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ANDREW WANG can be reached on 571-272-0811. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

mct  
September 17, 2004

  
PADMASHRI PONNALURI  
PRIMARY EXAMINER